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Tucson 2000: A Whirlwind Tour

... This systematic denial on science's part of personal identity as a condition of events, this rigorous belief that in its own essential and innermost nature our world is a strictly impersonal world, may, conceivably, as the whirligig of time goes round, prove to be the very defect that our descendants will be most surprised at in our own boasted science, the omission that to their eyes will most tend to make it look perspectiveless and short.

William James

The theme of this year's Tucson conference involved the integration of first- and third-person perspectives and methodologies. It featured eminent researchers in a variety of fields; experts on such diverse disciplines as cortical processing, quantum mechanics, and Buddhist meditation. For the more than 700 participants, the five days of lectures and poster presentations offered an overwhelming array of theoretical proposals and experimental findings.

Ringmaster David Chalmers opened the conference by briefly recapping the history of the biannual gathering. In many ways, his remarks were similar to the address which began the 1998 conference. He pointed out that the character of contributions to the field has gone through a transition, from primarily comprehensive, and largely incompatible 'grand theories', to a spirit of incremental contributions which he suggested has led to genuine progress in many areas.

Nobel Laureate Gerald Edelman started things off in the first session on neurobiological models of consciousness. His presentation began with a review of re-entrant signalling among neuronal groups, the foundation of the models of primary and higher-order consciousness described in his 1990 *Remembered Present*, and culminated with a new theoretical development, the notion of a Dynamic Core, a continually changing complex of re-entrantly synchronized neural activity that Edelman suggests may define the substance and content of consciousness.

The distributed vision of the NCC that Edelman presented contrasted sharply with the ideas of the next speaker, John Taylor, who suggested a putative neurobiological mechanism centred around a specific consciousness module located in the parietal lobe. Glancing over at Edelman, I noticed him clutching his head — in frustration, deep thought, or exhaustion, I couldn't tell. John O'Keefe brought the session to a close with new data garnered from electrophysiological studies in the hippocampus of rats. In contrast to many recent contributions that implicate coherent neural oscillations in the gamma (40Hz) range in binding various processing centres, O'Keefe's

results suggest that oscillations in the theta (5Hz–10Hz) range in the hippocampus may perform a similar function, as well as serving as a source of temporal labeling for processes in other brain areas.

The first-person perspective made a dramatic appearance in the next session, entitled ‘What Can an Achromat Know about Colour Experience?’ Colour scientist Knut Nordby, the first speaker, talked about the experience of achromats — rare individuals who have no experience of colour whatsoever. An already entertaining presentation entitled ‘What is This You Call Colour?’ was made more interesting by the addition of several personal anecdotes, as Nordby is in fact an achromat himself. Kathleen Akins followed with an exploration of human colour processing, arguing first that the spectral responses of the three different kinds of cone receptors provide more useful information than just perceived colour — that one should think of spectral, rather than colour processing, and second, that the experience of an achromat is thus unlikely to be adequately characterized as simply lacking colour (as in a black-and-white television). Of course, when it comes to colour vision, one can’t have a talk about phenomenal experience and neuroscientific understanding without inviting Frank Jackson’s ‘Mary’ along (especially if you have David Chalmers leading the session), and the famous *gedanken* neuroscientist made several appearances and prompted a number of interesting responses from both presenters, including an interesting confession from Nordby, that were he offered the opportunity to perceive normal colour (through a novel surgical procedure, for example), he expected that he would *not* be willing to go through the confusing process of learning to live in a coloured world.

The afternoon plenary session chaired by Francisco Varela began with Russell Hurlburt’s description of a unique methodology used to capture and study ‘the diverse inhabitants of conscious awareness’, what he referred to (following Dennett) as the Denizens of the Phenom. Hurlburt’s subjects carry a random beeper with them during their normal everyday activities which prompts them at various intervals to record written descriptions of their immediate mental content. This technique has led Hurlburt to a number of interesting findings, including the discovery that in the natural environment of daily life, we are occupied more than 95 per cent of the time with mental activity which goes far beyond mere sensation. Hurlburt grouped his subjects’ reports into a number of categories, which included inner speech, images, feeling, and unsymbolized thinking — a grouping which prompted one audience member to vehemently respond ‘I just don’t understand this concept of “uncivilized thinking” you keep referring to’. B.A. Wallace followed, arguing that progress in the refinement of first-person introspective methods has lagged far behind progress in third-person methodologies, and that various meditative techniques, for example, are needed to complement cognitive scientific approaches to consciousness. Wallace went on to discuss Buddhist contemplative techniques, which he argued could be used to reveal new information about the substance and structure of mental states with a sophistication comparable to the results of objective scientific inquiry about the brain. His talk garnered a critical outburst from Susan Blackmore, who chided him severely for not giving proper respect to scientific objective methods. His response, along the lines that scientific methods do not give a be-all and end-all description of the world, sent ripples through the audience, and one participant remarked later that he either showed

amazing restraint or oversight by not bringing up the fact that he was well trained in the scientific method, with a PhD in physics.

Some of the afternoon concurrent sessions built on the morning's plenary presentations, with additional sessions on neurobiological correlates and first-person methodologies, for example. Others introduced new subjects. 'Art, Aesthetics, and Consciousness' was well attended, as was 'Sleep Dreaming' and 'Anaesthesia'. One could see lone participants hurrying back and forth across the courtyard of the convention centre trying to take in speakers from more than one session.

As the sun began to set and the Santa Catalina mountains grew hazy in the distance, a flood of participants spilled down Congress Street in search of less intellectual sustenance. Those disguised as locals (who had remembered to remove their Tucson 2000 name tags) would have been indistinguishable from the general population except for the overheard topics of their conversations. It was a somewhat startling experience to find a seat at a cheap pizza joint and hear the people in the booth next to you speculating about the physical processes underlying consciousness, but it was an experience the likes of which became almost commonplace over the week.

Monday night offered the first of three poster sessions, where the variety of approaches to the subject became really evident. Hundreds of posters were grouped in necessarily broad categories; neurobiology, philosophy, culture and humanities, and others. From six-foot wide laminated spreads to single type written pages, Monday's posters included such diverse titles as 'Can a Zombie Pay Attention', 'High Frequency Oscillations and the Subjective Experience of Pain', and 'How Hegel can Contribute to Our Understanding of Consciousness'.

Tuesday began with the provocatively titled session 'Is Visual Consciousness a Grand Illusion?'. The session was moderated by Alva Noë, who has used the term 'Grand Illusion Hypotheses' to refer to various theories of visual perception which emphasize the disparity between our experience of a rich well-defined visual field and experimental results which seem to indicate that our visual world is actually an illusion — somewhat like the illusion that the light in the refrigerator is always on. Kevin O'Regan presented some startling results from continuing research on change blindness, describing various experiments which show that surprisingly large changes in a visual scene can occur without perception if small distracting 'mud splotches' are superimposed on the scene at the moment the change is made. In order to account for these and other findings he has suggested (in a pending paper co-authored with Noë) that seeing does not involve the construction of a detailed internal representation, but is essentially a way of acting in the world. Arien Mack presented experimental results which led her and others to the concept of 'inattention blindness'. Through thousands of trials, Mack has shown that a large majority of individuals somehow fail to notice a supra threshold (i.e. normally visible) stimulus directly in their visual field if their attention is absorbed by a distracting visual task. With further study, Mack found that a certain few highly meaningful stimuli (the subject's name, a happy face, and a stick figure of a person, for example) do have a better chance of being perceived. Interestingly, these meaningful stimuli require a high level of processing, suggesting that the attentional mechanisms do not simply operate on the immediate contents of the visual field. Jeremy Wolfe closed the session with a talk entitled 'Post-attentive Vision and the Illusion of Perception'. When we attend to patches of shape and colour in our visual field, they are bound

together as objects. Wolfe went on to ask whether we retain the bound per cept of the object when atten tion is directed elsewhere, or if the object's fea tures dis solve back into a primordial soup of pre-attentive features. If one thing was clear after the ses sion, it was that when it comes to visual con scious ness, things are almost never what they seem.

The second Tuesday morning session focussed on the use of ayhuasca, an orally active botanical preparation of DMT found in various South American cultures. There was good evi dence that many atten dees at the con fer ence were at least implic itly interested in the subject of phar ma co log i cally induced altered states of con scious ness; for example, an afternoon session on the subject drew a larger audience than several of the other concurrent sessions combined. The conference organizers showed forethought in scheduling this session, however, as it put altered-state phe nom en ol ogy on cen tre stage while avoid ing var i ous charged debates about the use of synthetic drugs such as LSD and MDMA (although some attendees might have wished for more dis cus sion of the effects of these drugs). The first pre sen ta tion, given by Luis Edu ardo Luna, showcased the vivid paint ings of one Bra zil ian ayhuasca sha man. Leaning over the podium and gesturing energetically, Luna talked about the colourful and rich phenomenology and iconography of the ayhuasca visions, ending with the spirited claim 'Shamans do know things!' Cognitive psychologist Benny Shanon followed. He presented the results of interviews with over 200 individuals who had taken ayhuasca (both West erners and natives), and described his own expe ri ences with the psychedelic brew. He emphasized the idea that ayhuasca is not a 'one-and-done' experience, that it takes many sessions to become proficient in exploring the altered state.

The Tuesday afternoon plenary session addressed the concept of self-consciousness. Robert Van Gulick began by taking a somewhat Kantian bent, arguing that we should expand the notion of self-consciousness 'downward', to include more than simply meta-consciousness, but also the various implicit self-oriented processes which contribute to the organization of higher-order consciousness. Susan Blackmore followed with a talk entitled 'Dismantling the Self-Plex: Meme Machines and the Nature of Consciousness' based on ideas developed by Rich ard Dawkins in the eight ies. Memetic the ory itself is inter est ing and per haps deserves some mention, if only for the fact that it drew many references through out the rest of the week. Accord ing to the the ory, 'memes' are infor ma tion or cul tural arti facts sub ject to the same laws of Dar win ian selec tion as their bio log i cal counter parts; Chris tian ity, com mu nism, and the Art ist For merly Known as Prince, for example. Meme machines are 'selective imitators', i.e. human beings, in which memes exist, vary, and are passed to other meme machines. In a fur ther devel op ment of the the ory, a 'meme-plex' describes a group of memes which exist and reproduce together in an interdependent or symbiotic way, and therefor, the 'self-plex', which was the sub ject of Blackmore's talk, is the group of memes in any one meme-machine which derive increased fit ness by their ties to the extraor di narily suc cess ful meme of 'self'. But Blackmore stopped short of say ing that con scious ness itself was a meme or meme-plex. 'If the self-plex is dismantled and the memes fall away', she argued, 'there is still something left. And what that is,' she concluded, 'I have no idea.' The 'meme-meme', the idea of memes, was surprisingly successful. Blackmore could often be seen being mobbed by various participants in the courtyard between

sessions. At the end of the Tuesday session, Susan Hurley, the final speaker, glanced over at a group of audience members who had wandered on stage and gasped in mock surprise, 'Susan, are you signing *autographs*?'

Hurley's talk was on the subject of self-consciousness in animals, especially dolphins and non-human primates. She argued that self-consciousness need not require human conceptual abilities, and outlined several ways to envision non-conceptual self-consciousness in animals, concluding that 'agency and reasons for action, rather than self-knowledge and reasons for belief, are central to understanding how creatures without conceptual abilities might be self-conscious'.

Once again, the afternoon concurrent sessions offered a difficult-to-choose from array of topics including 'Blindsight and Vision', 'Spiritual Intelligence', and 'Hypnosis and Meditation'. One fascinating session explored the age-old topic of the relationship between consciousness and time. Larry Hitterdale's talk at that session presented an interesting challenge to purely materialist solutions to the mind-body problem, based on the disparity between the temporally symmetric 'block universe' description of time given by physical theory, (i.e. special relativity), and the inefable temporal flow that defines our conscious experience. Hitterdale pointed out that the materialist is faced with the difficult problem of explaining why the ordinary physical processes which constitute consciousness perform the 'rather large task' of creating our perception of a linear, temporally localized, asymmetric series of events. Of course, not all the presentations were perhaps as challenging or well thought out, an example being M. Weinand's talk on internal time processing in epilepsy. Weinand, a neurosurgeon at the University of Arizona, made the startling suggestion that 'reverse' and 'imaginary' time processing occur around and during epileptic seizure. This conclusion was based only on negative and imaginary number results given by a Mathematica model of seizure onset and cerebral blood flow. As if the relationship between consciousness and time wasn't puzzling enough, Weinand seemed determined to compound the mystery, refusing to clarify what he meant by 'reverse', 'imaginary', or even 'time processing', shaking his head and smiling enigmatically at various incredulous responses from the audience.

Thankfully, Wednesday offered some respite from the grueling schedule, with just two interesting plenary sessions in the morning. The first was on the increasingly popular subject of neural synchrony. The possibility that modally or spatially separated stimuli may be integrated by temporally coherent neural activity is intuitively appealing, and an increasing body of evidence has arisen recently to support the idea that the neural correlate of consciousness (NCC) may be globally distributed (as in Edelman's Dynamic Core) rather than localized in one particular anatomical area (as in Taylor's parietal lobe hypothesis). Ironically, the session was chaired by Christof Koch, one of the more prominent scientists who has expressed reservations about the idea that the NCC is globally distributed.

The second Wednesday session focussed on prosopagnosia, the inability of some individuals with various neural pathologies to detect or process faces. Morris Moscovitch presented a fascinating study of a man with a closed head injury who had what seemed to be the opposite defect — he could no longer recognize simple objects such as a bike, a camel, or a book, but he had excellent facial recognition skills — better indeed than many members of the audience. When presented with a picture of vegetables arranged like a face, Moscovitch's subject saw a clear image of a face but

could not report seeing onions, broccoli, or carrots. Using this individual, Moscovitch was able to draw a fine line between tasks which require object and face recognition abilities. For example, the subject could recognize silhouettes, cartoon characters, and caricatures, but not upside down faces or faces with central portions removed. It seemed clear from his talk that the mechanisms we use to recognize faces are significantly distinct from the mechanisms of ordinary object discrimination.

The face-blindness session was a good example of the discourse between first- and third-person approaches that the conference organizers hoped to achieve. Throughout the duration of the conference, various speakers made some times impassioned arguments that first-person accounts should be considered central to the scientific study of consciousness, not simply tangential to third-person methodologies. Shinzen Young, for example, during the Friday morning session on meditation and consciousness, suggested that scientists studying the neural correlates of meditative states should consider trained meditators as collaborators, not simply subjects, thus somewhat echoing B.A. Wallace's statements from the first session of the conference. But if there was any evidence of a commitment to take first-person methodologies seriously, it was the inclusion of several speakers who were able to provide relevant accounts of the view from within. Knut Nordby's discussion of achromatism was one example, as was Benny Shanon's description of the ayahuasca experience. Likewise in the Wednesday afternoon session, Moscovitch's interesting description of a cognitive-science approach was preceded by a talk entitled 'A World Without Faces' given by a prosopagnosic, Bill Choisser.

Choisser described how he used his recognition of certain specific object cues, specifically long hair and blue jeans, to compensate for his lack of facial perception, providing an interesting confirmation of Moscovitch's findings. Apparently, the tendency to choose certain key traits as a surrogate for faces is common among prosopagnosics and occurs at an early age. Choisser's description of his experience was fascinating. He described sensing emotions from the way a person's jeans moved, and feeling lonely if he could not interact with people who possessed his chosen key traits. After five days in the Navy, for example, surrounded by short-haired uniformed men, he suffered a nervous breakdown. Surprisingly, Choisser realized that he was prosopagnosic only recently. For many years, he didn't even have long hair himself, and he described the experience of looking in the mirror as literally not having a face. 'My world,' he concluded, 'is very much one of bearded, long-haired men.'

For those who could afford it, there were opportunities on Wednesday afternoon to visit various attractions around Tucson, with guided trips to Tubac and San Xavier and a tour of Sabino Canyon. And as evening approached, many participants piled on chartered buses to make the trip to the Arizona-Sonoran Desert Museum, the site of this year's conference banquet. What follows is a first-hand account of the banquet from one of the younger participants:

The banquet was really great, I thought. OK, the food was profoundly unworthy of its price tag (lukewarm banquet style), but the museum was beautiful. It was kinda in the middle of nowhere, but the scenery was fabulous — all these little intimate gardens and outdoor rooms filled with meticulously organized blooming cacti, rocks and succulents. I was bitter that the drinks still cost a ton, despite the \$45 we'd already paid for the

distinction of eating, but I got over it, distracted by the docents displaying cute little tarantulas and hissing cockroaches. That was a nice touch.

The conversation was lively and intimate, as no table sat more than five people and most sat fewer. Nothing really unusual happened as far as I know — our table held one of the editors of the *Journal of Consciousness Studies*, a kindly physician, a Berkeley grad student, me, and a couple of guys whose purpose I've forgotten.

One notable thing was the fact that this crazy museum guard on a golf cart was constantly circling, roughly rounding up any people who tried to stray into the Arizona night for a quick glance at the stars or a breath of non-scientist-recycled air. He was a little scary, although I can see why you wouldn't want any of the conferencees to get lost, especially those less young or sober.

Thursday morning was back to the grind, and if you can't believe that to this point I've only covered the first three days, you get the sense of epic discussion that one felt actually being there for a full week. The topic of Thursday's first session was the relationship between consciousness and volition. Is consciousness merely an epiphenomenon, the foam on the crest of the wave, a purple haze floating on neural processes? Or is consciousness the source of agency that many people (if not some notable philosophers) perceive it to be? Psychologist Daniel Wegner started things off by clarifying the notion of volition. Free agency, or conscious will, he said, is simply an interpretation of one's conscious thought as causing action. He then went on to suggest that the apparent causal relationship between conscious thought and action reflects the fact that thought and action are generally congruent, not that they are causally linked. In fact, he concluded, both are actually caused by related unconscious processes. The experience of conscious will, then, is real, but the causal link we infer from that experience is not necessarily valid. Philosopher John Searle was the next to the podium, building on the foundation that Wegner laid. He pointed out that there is a causal gap between our consciously perceived decision-making processes and the resulting action we take. It is precisely this gap, he continued, wherein enters the notion of free will. One is reminded somewhat of Sartre, who said that the vertigo a person feels standing on a mountain ledge is not the fear that he will slip, but the fear that his decision to stay on the ledge is not causally sufficient to prevent himself from leaping into the abyss. Searle went on, however, to suggest that the absence of causal sufficiency at the high-level description of thought and action does not go all the way down, that at the level of neuronal processes, things are in fact causally deterministic, which confused some people. Several authors have criticized Searle for presenting all sorts of arguments against mechanistic determinism and functionalism, while at the same time staunchly holding to a declared materialism, suggesting that he has painted himself into a corner. Interestingly enough, Searle suggested that the tendency to stop at the level of the neuron is somewhat biased, although he didn't go as far as to refer explicitly to theories such as Penrose and Hameroff's, which make heavy use of the fundamentally non-deterministic properties of quantum mechanics. Later that day I overheard two notable philosophers wondering whether he would ever resort to dualism as a way out of the dilemma, going so far as to make a \$20 bet about whether Searle would 'finally come clean' as a closet dualist in a pending paper. Chris Frith, the final speaker of the session, continued in the same vein as Wegner and Searle, focussing more specifically on cases of psychosis where the experience of a causal relationship between thought and action breaks down. Patients

with out coherent 'forward models' of the results of their actions describe a feeling of some other agency willing their movements, and lose the ability to discriminate between, as Frith put it, 'the sensory consequences of their own actions and independent events in the environment'.

The second Thursday session focussed on the phenomenon of synaesthesia, a form of cross-modal linkage which occurs in only perhaps one in several thousand people. For synaesthetes, sensations in one modality can trigger simultaneous sensations in another. A certain taste, for example, can trigger a very specific and vivid experience of colour. Peter Grossenbacher gave a fascinating overview of reports gathered from twenty-four synaesthetes, emphasizing that synaesthetes do not simply perceive these cross-modal sensations in a metaphorical sense, but as real perceptions of colour, touch, etc., which are sometimes located in a specific spatial location, and almost always appear consistently through many presentations of the same stimulus. For one synaesthete, the letter 'A' appeared as a very specific shade of pink, as if 'the letters were holes in the paper and a light was shining through from behind.' Interestingly enough, most synaesthetes seemed to enjoy the synaesthetic experience, even finding it useful at times. One individual who saw months arranged like seats on a Ferris wheel in front of her could n't imagine keeping her schedule straight any other way. On the other hand, most synaesthetes also reported that synaesthetic perception could be overwhelming and distracting. Grossenbacher's overview set the stage for Jason Mattingly's exploration of colour-graphemic synaesthesia, the specific form in which letters, words, and numbers trigger experiences of specific colours. Mattingly showed that synaesthetes took a relatively shorter time to identify the colour of a congruently coloured letter (i.e. a letter the same colour as the invoked synaesthetic percept) than an incongruently coloured one. Unsurprisingly, control individuals showed no difference in the two trials. Mattingly concluded that the synaesthetes' performances on such tasks is evidence that additional perceptual processing (of the invoked sensation) is occurring in these individuals. Once again, after the speakers were finished, the audience had a chance to hear first-hand reports from a panel of five or six synaesthetes who gave brief descriptions of their experiences.

The final session on Thursday focussed on verbal reports as a guide to consciousness. This session was especially interesting given the conference's focus, as verbal reports serve as the primary gateway between first- and third-person methodologies. Lawrence Weiskrantz, professor emeritus of the phenomenon of blindsight, gave a talk on the subject which sadly was rendered almost incomprehensible by malfunctions of the convention centre sound system. Studies of blindsight have been extremely fruitful for attempts to distinguish between conscious and unconscious processes, the key distinction which many authors (Bernard Baars, for example) have argued gives us the epistemic hook we need to develop a theory about the NCC. The phenomenon of blindsight presents a relatively clear set of experimentally accessible questions, and research on the subject has reached a notably high level of sophistication. For example, Weiskrantz finished his talk by referring to a current study which shows that even an unseen after-effect of an unseen coloured stimulus can have experimentally detectable results. Jonathan Schooler suggested that in addition to the line between conscious and unconscious processes, it is important to distinguish between conscious and meta-conscious processes. He pointed out that asking an experimental subject to be meta-conscious of their experience often has disruptive

effects on the spontaneous mental activity they're asked to observe, concluding that more accurate introspective reports might be achieved by asking subjects for a quick 'read-off' of the contents of consciousness. Hurlburt's random beepers, for example, seemed to be an excellent example of the latter technique. Finally, Adam Zeman's talk was devoted to the conceivability and implications of unreportable consciousness, what he referred to as 'unarticulated flashes of experience' which might occur, say, in cases of extreme brain damage. At the very least, the possibility that consciousness might occur without being linked to mechanisms necessary for report (verbal or otherwise), presents serious inconveniences to attempts to develop a science of consciousness. Zeman's talk emphasized that while the wide spread assumption that consciousness and reportability are inextricably linked is perhaps the only paradigm under which to proceed experimentally, to a certain degree, the emperor just isn't wearing any clothes.

Thursday night after the concurrent sessions, about twenty of the students and younger attendees met for informal discussion at the Hotel Congress. The current incarnation of the study of consciousness is relatively new, and in one sense any one working on the NCC or the hard problem is new to the field. Paraphrasing Herbert Simon, it's as if a whole host of philosophers, psychologists, and neurobiologists woke up one day and discovered they were all studying the same thing. But like cognitive science in the fifties, what started as simply a common area of interest at the intersection of existing disciplines is developing into a field in its own right, and it was interesting to meet current students who are beginning to take for granted the problems and methods defined by a previous generation of researchers. The international flavour of the conference at large was reflected in this smaller group, with participants from all over the US and a number of European countries, including Holland, England, and Italy. It was a terrific sight to see almost two dozen people spread out in small groups on the floor of the hotel lobby, comparing interests and backgrounds and reactions to the day's talks. The Hotel's unbelievable ninety cent drink specials kept the conversation flowing for almost four hours until the loud music from the club next door and the disapproving looks of the hotel staff lured everyone to their feet.

Friday's session on quantum computation and consciousness began with an introduction to the concept and significance of quantum computation by Gerard Milburn. Milburn reviewed the history of the idea, beginning with Feynman's suggestion that a computer which utilized quantum superposition might be able to outperform a conventional computer, essentially by carrying out a huge number of computations simultaneously. More recently, Peter Shor has shown that a computer based on quantum principles could theoretically factor large numbers in polynomial time, a task which would have significant practical implications, as the security of the Internet, for example, is based largely on the practical impossibility of factoring large numbers quickly. Also fairly recently, David Deutsch has suggested that only a quantum computer is capable of modelling certain aspects of the world accurately, and Milburn finished by wondering about the possibility of a quantum simulation of consciousness. David Albert followed, with a talk entitled 'Mental Life and Physical Laws', and Stuart Hameroff finished the session with a review of the current state of the hypothesis he and Roger Penrose have developed. The Hameroff-Penrose model has the distinction of being one of the most specific and well-developed 'some-extra-ingredient-is-needed'

theories of consciousness, based on the notion that consciousness involves the microtubule-mediated superposition and quantum-gravity mediated collapse of relatively large assemblies of neurons in the brain.

The second session explored the relationship between consciousness and meditative states. Although several of the week's speakers referred to a disappointing lack of in-depth research on meditative consciousness, Shinzen Young made the most comprehensive proposal for future collaboration between meditators and cognitive neuroscientists. He suggested that the concept of attention, which is fundamental to both current scientific attempts to understand consciousness and to various contemplative traditions, might serve as the best bridge between first- and third-person methodologies. Young argued that both scientists and meditators might benefit from such collaboration, the former from sophisticated first-hand reports of mental states, and the latter from information about more natural categories and mechanisms that could result in better meditative techniques. He also made the interesting suggestion that functional brain imaging of attentional mechanisms in meditators might yield a higher signal-to-noise ratio than similar studies with untrained subjects. Young's call for further functional brain imaging studies was immediately answered by David Schnyer, who presented results from EEG studies of long-term meditators, a group of professional musicians, and a control group. There were murmurs from the audience as he presented his findings, which seemed to clearly indicate that the meditators showed significant differences in the dynamics of their attentional processing.

Friday's final session, the final presentation of the entire conference, was titled 'Neural Correlates of Conscious Vision and Imagery'. It is a fascinating topic, and the speakers were first-rate, but honestly, I missed it. I hit a wall, and it's my own loss — and now it's yours as well. Maybe now you'll decide to go to the conference yourself in 2002, rather than relying on the shaky testimony of whom ever the editors can finagle into writing the review next time. Another confession might be in order at this point. I've focussed on the plenary sessions, but that decision was somewhat arbitrary. It's a depressing fact that most of the concurrent sessions were comparable in every way to the plenaries, featuring well-known speakers and excellent presentations — depressing only because it meant that even if you were at the conference all day, every day, you were still missing more than half of the information being presented. As I think I've portrayed, it was a constant battle of stamina just to participate in full day's worth. Even the free coffee distributed between the morning sessions couldn't keep me as attentive as I would have liked.

However, even after the last transference of William James was removed from the overhead projector, and the last speaker responded to that final question on Friday afternoon, and the last gawking participant left the poster session on Friday night, the conference was far from over. There was still the biannual Consciousness Poetry Slam to attend, the perfect place to get that feeling of brain-fry and mind-bogglement off your chest and reclaim your microtubules. Stuart Hameroff looked the part of MC — the coolest cat in town — with his regular goatee capped off by a beatnik beret and dark sunglasses. After a few Elvis jokes, he surrendered the microphone to those members of the audience daring or desperate enough to express themselves in verse. The poetry ranged from serious, to tongue-in-cheek, to outright parody. All the denizens of the previous week came to life in new colour, from zombies to memes to William James (of course), and the spirit of the conference shone through the remnants of

rea soned debate. When the poetry was done, a three piece band kept time as one person after another jumped on stage with some times impromptu verses of the inde fat i-gable Zom bie blues.

you see me
and I see you
not a dif fer ence between us
'cept I ain't con-shus
Got them no-qualia-ain't-nothin'-it's-like-to-be-a zom bie blues.

(Well, you get the idea.) And when the final verse was sung, an impromptu dance broke out, leaving the musicians struggling to keep up with the remaining conferencees.

The atmosphere at the Saturday morning panel discussion moderated by Al Kaszniak was some what more sub dued (or at least sober). Stu art Hameroff, Mar i lyn Schlitz, David Chalmers, Donelson Dulany and Christof Koch gave short presentations and fielded a vari ety of ques tions on the cur rent state and future pos si bil i ties of con scious ness stud ies. Chalmers voiced the hope that the cur rent re nais sance of work on the subject of consciousness won't be followed by a period of neglect like the behaviourist backlash of the early part of the century. Koch expressed similar thoughts, point ing out that it's hard to know where we are in the devel op ment of a sci ence of con scious ness. Compared to the evo lu tion of phys ics, for exam ple, are we at Galileo, Newton, Maxwell, or Einstein? It was a question that many participants speculated on throughout the week. Some were optimistic that significant progress might be made in their lifetimes. Others, like one individual I talked to at the Hotel Congress dur ing the Thurs day night meet ing thought of things in lon ger terms. 'You know,' he said, 'this may be what people look back on in 300 years as the start of some thing impor tant. . . . Of course,' he admit ted after a min ute, 'that may just be the sort of thing I say at a bar at two in the morning with a beer in my hand.' In general, and in line with David Chalmers' opening remarks, the wide spread atti tude towards the current status of at least the 'hard problem' seemed realistic, but not resigned. Compared to the 1998 conference, there seemed to be less tolerance for claims of coherent, final theories, and an awareness that there were probably at least half as many such 'so lu tions' as there were par tic i pants in the lec ture hall at any given time. Chalmers had an appeal ing way of talk ing about the whole affair like a big polit i cal convention — you have the panpsychist cabal, the functionalist cabal, and others all roll ing around together try ing to con vince each other how to vote.

As a final oppor tu nity for peo ple to meet and talk infor mally, Chalmers extended a gen eral invi ta tion to a party at his house on Sat ur day night, which was well attended. Although he did n't announce it, it was his birth day as well, and Susan Blackmore and oth ers passed around a card and brought out a huge cake with dan ger ously large can dles. Unfortunately, the beautiful brain and zombie icing was rendered invisible by the hoard of hungry partygoers before Chalmers had the opportunity to see it, and Blackmore tried fran ti cally to reas sem ble the image out of the remain ing pieces. But alas, all that was left was a single zombie foot.

Thanks to Dia VanGunten for jogging my memory and Edy Moulton for her lovely description of the banquet.